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Slipping Rib Syndrome in a Collegiate Swimmer: A Case Report

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Objective: To present the unique case of a collegiate swimmer who experienced nearly 9 months of unresolved rib pain.

Background: A 20-year-old collegiate swimmer was jumping up and down, warming up before a race, when she experienced pain in the area of her left lower rib cage. She completed the event and 2 additional events that day with moderate discomfort. The athlete was evaluated by a certified athletic trainer 3 days postinjury and followed up over the next 9 months with the team physician, a chiropractor, a nonsurgical sports medicine physician, and a thoracic surgeon.

Differential Diagnosis: Intercostal strain, oblique strain, fractured rib, somatic dysfunction, hepatosplenic conditions, pleuritic chest pain, slipping rib syndrome.

Treatment: The athlete underwent 4 months of conservative treatment (eg, activity modification, ice, ultrasound, hot packs, nonsteroidal anti-inflammatory drugs) after the injury, independently sought chiropractic intervention (12 treatments) 4 to 6 months postinjury, was referred to physical therapy (10 visits) by a nonsurgical sports medicine physician 6 to 8 months postinjury, and finally underwent surgical intervention 9 months after the onset of the initial symptoms.

Uniqueness: Slipping rib syndrome was first described in 1919. However, many health care professionals who are involved with diagnosing and treating athletes and active individuals (eg, athletic trainers, physicians) are relatively unfamiliar with this musculoskeletal condition.

Conclusions: It is important for clinicians and team physicians to familiarize themselves with and consider the diagnosis of slipping rib syndrome when assessing and managing individuals with persistent abdominal and/or thoracic pain.

Key Words: thoracic injury, rib cage, hooking maneuver

Slipping rib syndrome is a condition that is often misdiagnosed or undiagnosed and can subsequently lead to months or years of unresolved abdominal and/or thoracic pain. Surgical findings suggest the condition arises from hypermobility of the anterior ends of the false rib costal cartilages,[1] which often leads to slipping of the affected rib under the superior adjacent rib.[2] This slippage or movement can lead to an irritation of the intercostal nerve,[3] strain of the intercostal muscles,[4] sprain of the lower costal cartilage,[5] or general inflammation in the affected area.

The medical literature primarily refers to this condition as slipping rib syndrome.[2–21] However, it has also been referred to as clicking rib,[22–25] displaced ribs,[11] interchondral subluxation,[24] nerve nipping,[26] painful rib syndrome,[27] rib tip syndrome,[28–30] slipping rib cartilage syndrome,[31,32] traumatic intercostal neuritis,[11] and 12th rib syndrome.[24,33–35] Even though slipping rib syndrome was first described in 1919[6] and many cases have been described in the medical literature, this condition is rarely mentioned in present-day medical textbooks.[4]

The syndrome may be the result of trauma,[28] but many cases have been reported in which no thoracic or abdominal trauma had occurred.[15,27] Clinically, patients often note intermittent sharp stabbing pain followed by a dull achy sensation for hours or days.[2,4,7,22] ''Slipping'' and ''popping'' sensations are common,[18,22] and activities such as bending, coughing, deep breathing, lifting, reaching, rising from a chair, stretching, and turning in bed often exacerbate the symptoms.[2,4,11,18,19,22,23,27]

Our purpose is to present the unique case of a collegiate swimmer who experienced unresolved thoracic pain for more than 8 months, was ultimately diagnosed with slipping rib syndrome, and underwent surgical intervention. (Surgical intervention usually results in the resection of abnormal cartilaginous attachments or portions of problematic ribs.) We feel it is important for clinicians and team physicians to become familiar with the signs and symptoms associated with slipping rib syndrome to facilitate the proper recognition and treatment of this condition.

CASE REPORT

A 20-year-old female collegiate swimmer was jumping up and down and gently swinging her arms, warming up before a race, when she noticed mild pain in the area of her left lower rib cage. The athlete completed the race and 2 additional races

that day with mild discomfort. Three days after the onset of symptoms, she was evaluated by a certified athletic trainer. During this initial injury evaluation, the athlete reported that she was having trouble sleeping, had moderate diffuse pain in the region of her left lower rib cage (ribs 8–12 and near the costal-cartilage junction) with pain at this same level in the back, and was most comfortable in a slouched position. The evaluation also revealed that compression (anterior-posterior and lateral), Valsalva, and sit-up tests were positive, reproducing pain. No swelling, deformity, or ecchymosis was noted. The athlete was also evaluated by a team physician the following day, which resulted in no further remarkable findings.

Over the next 4 months, the athlete's activities were modified. She also iced, stretched, received ultrasound treatments, used hot packs, and took over-the-counter nonsteroidal antiinflammatory drugs. During this period, the athlete experienced intermittent periods of relief, followed by relapses as she tried to increase her activity level. Unsatisfied because of her persistent symptoms, the athlete independently sought chiropractic care 4 months postinjury. Chiropractic care consisted of spinal manipulation and electric stimulation for 12 treatments and resulted in intermittent periods of improvement but no long-term relief.

Six months postinjury, the athlete was seen by a nonsurgical sports medicine physician. The physician diagnosed the condition as left lower rib cage pain and somatic dysfunction and referred her to physical therapy. Over the next 2 months, the athlete completed 10 physical therapy sessions, with the focus of the treatments being a variety of manual therapy mobilization techniques (eg, soft tissue mobilization, myofascial release, anterior-posterior mobilization from T9 through L2) and stretching and strengthening activities. The therapy visits had no remarkable effect on the athlete's pain level.

Over the 9 months after the onset of pain, the athlete underwent multiple imaging tests (ie, radiographs, bone scan). Radiographs by the team physician (4 days postinjury), chiropractor (4 months postinjury), and sports medicine physician (6 months postinjury) were all negative. A bone scan performed 6 months postinjury was also unremarkable.

Nearly 9 months postinjury, the athlete was referred to a thoracic surgeon who suspected slipping rib syndrome. The thoracic surgeon performed the hooking maneuver (a little-known clinical special test) with and without a nerve block, and the test was positive, reproducing the pain. The athlete underwent surgery 1 week later for resection of an abnormal cartilaginous attachment of rib 11 to 10 as well as a resection of a portion of the rib 12.

After surgery, the athlete was restricted in activity for 6 weeks. After this time, light rehabilitation exercises (eg, abdominal work, core stabilization exercises, cycle ergometer) were initiated, and minimal pool work (eg, swimming 200–300 yards per day) was also started. The athlete progressed with her rehabilitation program and was swimming 2000 yards per day at 8 weeks postsurgery and 6000 yards 12 weeks postsurgery. However, she continued to report mild discomfort. Twenty weeks postsurgery, the athlete successfully competed at the conference championships with mild discomfort, earning 2 all-conference honors, and also competed at nationals at 24 weeks postsurgery, earning 2 all-American honors.

This case is unique in that the athlete was diagnosed with a musculoskeletal condition rarely mentioned in present-day medical and athletic training textbooks, one that is frequently misdiagnosed or undiagnosed by clinicians and team physicians.

DISCUSSION

Slipping rib syndrome was first described in 1919[6] and officially named in 1922.[7] However, the first series of cases was not reported in the literature until nearly 20 years later.[31,32] Cases have been reported in children as young as 12 years through individuals in their mid 80s, with the syndrome affecting females slightly more than males. Signs and symptoms are usually unilateral; however, a number of bilateral cases have been reported.[15,25,27]

Rib hypermobility caused by weakness of the rib-sternum (sternocostal), rib-cartilage (costochondral), and/or rib-vertebral (costovertebral/costotransverse) ligaments, allowing rib hypermobility, is thought to be the primary cause of slipping rib syndrome.[36] Ribs 8 through 10 (false ribs), which are not connected to the sternum but are connected to each other via a cartilaginous cap or fibrous band, tend to be the most mobile and susceptible to trauma. Because of this, slipping rib syndrome is usually caused by hypermobility of rib 8, 9, or 10. Anterior rib hypermobility is also likely to cause problems in the posterior thoracic area as well because in a closed system (in this case, the rib cage) it is difficult for motion to occur at 1 site (the anterior portion of the rib) without causing motion to occur elsewhere (the posterior portion of the rib).[36] So, as was the case with our athlete, the condition often results in back pain.

The differential diagnosis of slipping rib syndrome includes a variety of conditions, such as cholecystitis, esophagitis, gastric ulcer, hepatosplenic abnormalities, stress fracture, inflammation of the chondral cartilage, and pleuritic chest pain.[4] A quick way to rule out these conditions is to look for an association between certain movements or postures and pain intensity, determine if the patient has experienced recent trauma (although not always present), and reproduce the symptoms (eg, pain, clicking) with the hooking maneuver. The hooking maneuver, a relatively simple clinical test, was first described in 1977.[11] The clinician places his or her fingers under the lower costal margin and pulls the hand in an anterior direction. Pain or clicking indicates a positive test. It is recommended that the hooking maneuver be followed with a rib block to see if the pain can be relieved.[36] Radiologic imaging is generally not useful in the diagnosis of slipping rib syndrome but may be of value in ruling out other conditions in the differential diagnosis.[1]

Once the diagnosis of slipping rib syndrome has been made, the patient should be educated concerning the condition. Simple reassurance (eg, ''there is nothing seriously wrong with you'') and the avoidance of movements or postures that exacerbate symptoms may be sufficient in eliciting a successful outcome.[15] However, in patients with more severe pain and dysfunction, nerve blocks and surgical intervention may be necessary. Conservative and surgical outcomes reported in the literature have generally been good. Yet these results should be viewed with some caution, as clinicians may not be as forthcoming in reporting failed case reports and case series.[1]

CONCLUSIONS

Slipping rib syndrome is a condition that is relatively easy to diagnose if detected early by clinicians and team physicians.

We feel it is important for health care providers, especially individuals involved with populations that may be at higher risk for chest-wall impacts (eg, rugby, hockey, football players), to familiarize themselves with the signs and symptoms of slipping rib syndrome and the hooking maneuver. Such knowledge could help lead to the early and proper diagnosis of the condition, potentially helping our athletes and clients avoid months or even years of unnecessary pain and discomfort.

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